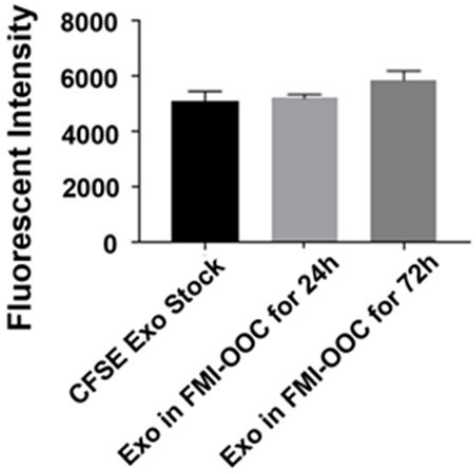
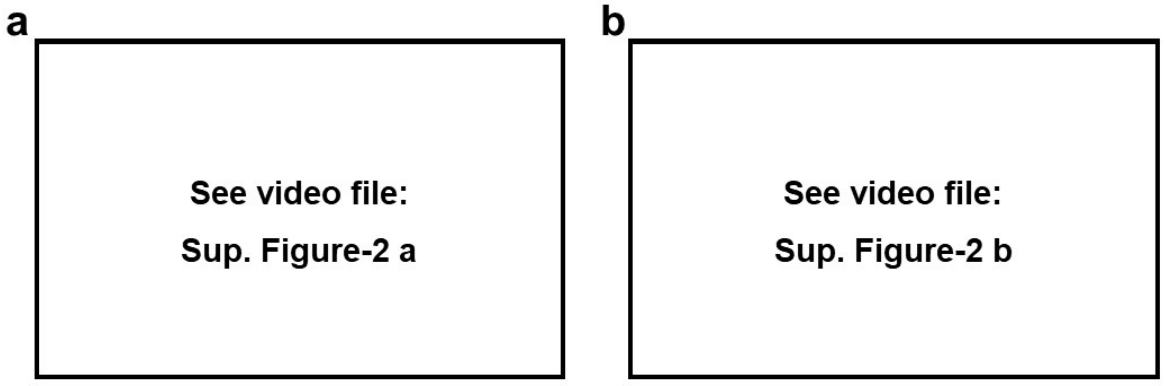
Electronic Supplementary Material (ESI) for Lab on a Chip.

SUPPLEMENTAL FIGURES



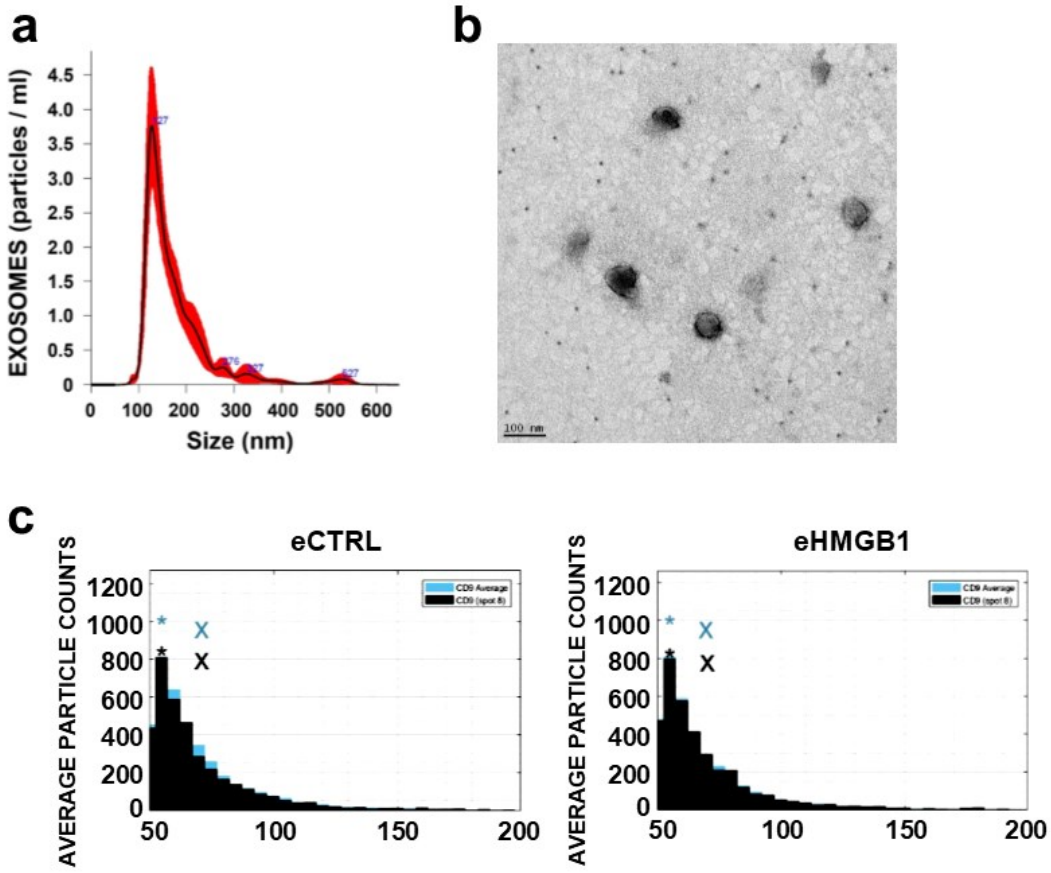
Supplementary Fig.1 Fluorescently labeled exosomes trafficking through the layers of cell lines in FMi-OOC device.

Florescent plate reader measured CFSE-labeled florescent exosome concentrations within the FMi-OOC, showing no difference over 72 h period, indicating no or limited absorption of exosomes to the PDMS device or reservoir system (n = 3). Values are expressed as means ± SEM.



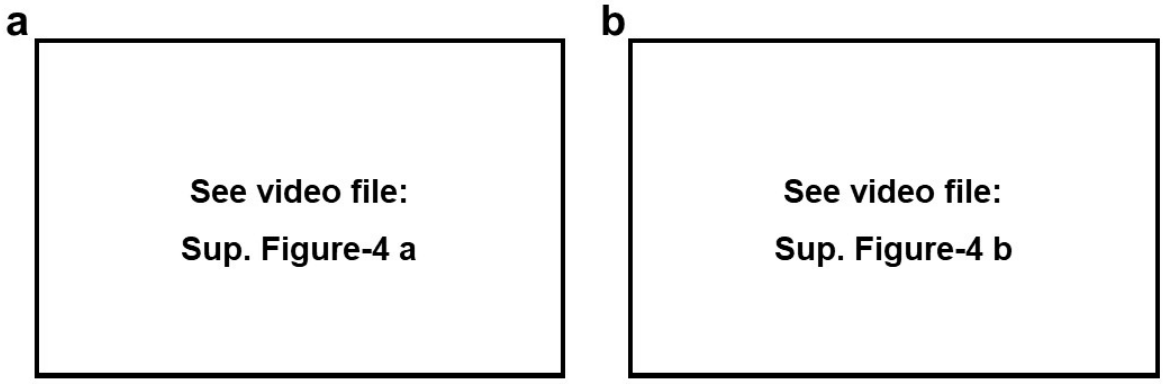
Supplementary Fig.2 Time-lapse movie of transiently expressed HMGB1-GFP colocalization with CD9-RFP in amnion epithelial cells (CD9-RFP-AECs) under oxidative stress condition. **(a)** Transiently expressed HMGB1-GFP translocation into the cytoplasm

against oxidative stress (OS) induction by cigarette smoke extract (CSE) within 24 h. **(b)** Colocalization of HMGB1-GFP with CD9-RFP in AECs induced by OS. Time-lapse captured for 24 h with Keyence microscope.

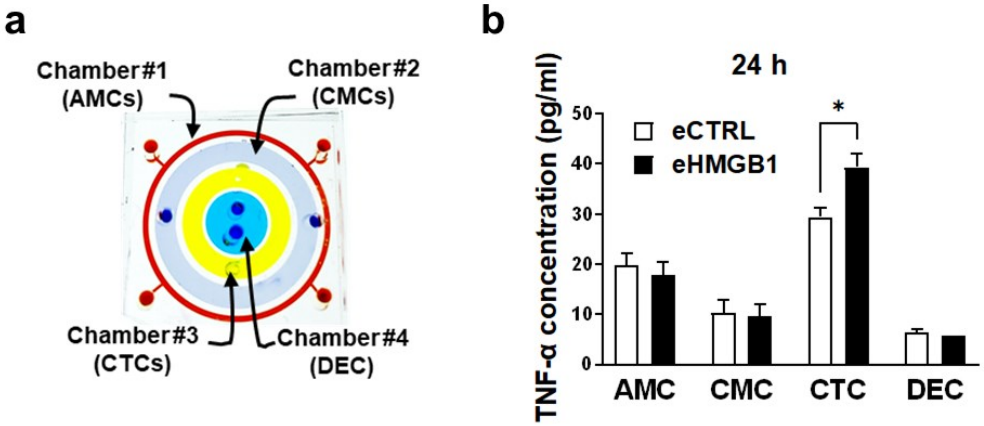


Supplementary Fig.3 Characterization of AEC-derived exosomes. (a) Size distribution of AEC-derived exosomes before electroporation with nanoparticle tracking analysis (NTA) (n=5). **(b).** Representative wide-field transmission electron microscopy (TEM) images of AEC-derived exosomes before electroporation (N=3). **(c)** Representative graphs of engineered eCTRL and eHMGB1 CD9-captured exosomes

size distribution by ExoView analysis.

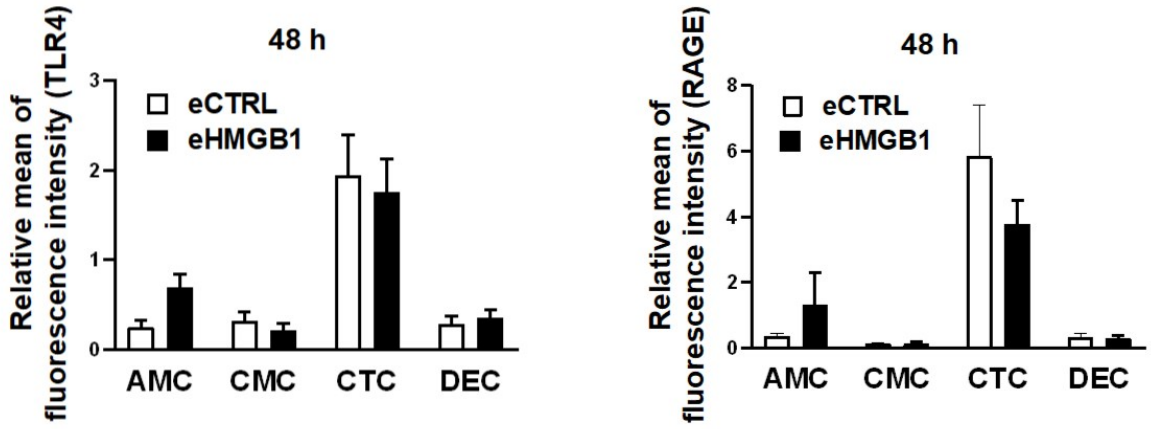


Supplementary Fig.4 Exosomes trafficking through the layers of cell lines in FMi-OOC device. (a) Time-lapse movies of endogenous and exogenous exosomes trafficking across cell layers. **(b)** movie merged with phase contrast. Scale Bars, 50 μm.

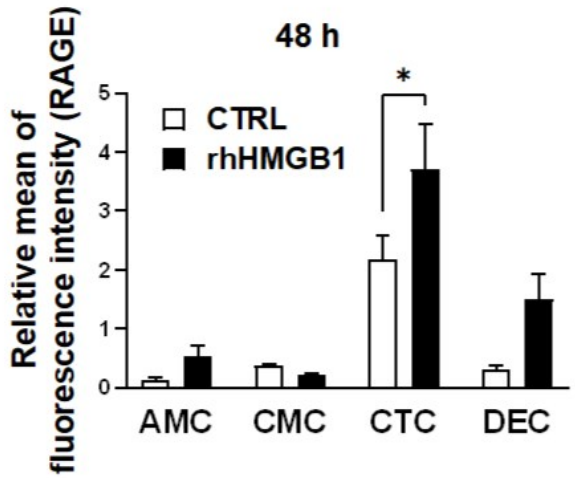


Supplementary Fig.S5 Engineered HMGB1-exosomes trafficking initiates the activation of inflammatory cytokine production throughout fetal membrane cells

(a) Image of the FMi-OOC for inflammation propagation study. AMCs (chamber 1), CMCs (chamber 2), CTCs (chamber 3) and DEC (chamber 4) were seeded as indicated. **(b)** Secreted cytokine TNF-α level was measured by immunoassay using the culture media from 24 h treatment (n=3). The data is presented as the means ± SEM. *P < 0.05, two-way analysis of variance (ANOVA).



Supplementary Fig.S6 Engineered HMGB1-exosomes trafficking is blocked no channel FMi-OOC devices. Fluorescence signal intensity of TLR4 and RAGE expression was measured at indicated time periods by ImageJ (n=3). The data is presented as the means ± SEM. two-way analysis of variance (ANOVA).



Supplementary Fig.S7 rhHMGB1 treatment induced RAGE expression in FMi-OOC devices. Fluorescence signal intensity of RAGE expression was measured at 48 h by ImageJ (n=3). The data is presented as the means ± SEM. *P*=0.016, two-way analysis of variance (ANOVA).